

I must confess that, although every conclusion reached through labor bestowed gives a certain pleasure in legitimate appetite for knowledge gratified, yet this is so far beneath what I had thought might lie hidden under the mystery of the brownian movements, I experience a sense of disappointment. I had thought that this investigation might be one of the paths that lead to the solution of the question whether or not energy is immanent in matter or a thing apart from it. For many years after the beginning of this century nothing fundamental in physics was known beyond the fact that matter is indestructible. It has been learned since, but no longer ago than about fifty years, that energy also is indestructible. It still remains perhaps to be shown that energy is but an emanation and manifestation of matter, reacting on it. Advanced as our knowledge is within a few years as to molecular movement, I had hoped that the investigation of the brownian movements might yield some contribution to molecular theory, and thence lead to a profounder knowledge than we now possess of molecular behavior in the abstract. I am able, however, to claim for the demonstration here no more than that the brownian movements are not the self-movements of finely divided particles in suspension in aqueous solutions, which Herr Wiener had also ascertained, but simply that which he did not ascertain, movements generated by the molecular action of aqueous fluids, instead of being, as he and Herr Exner also thought, in differing form, phenomena due to light and heat. Perhaps even this moderate conclusion may be disputed, but it remains to be disproved.

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*Obituary Notice of Thomas Mutter Cleeman.*

*By Frederick Prime.*

*(Read before the American Philosophical Society, April 6, 1894)*

In the year just past, this Society has been called on to mourn the loss of more than the usual number of its resident members. Of these many were taken in the ripeness of their years with their life's work accomplished; some, however, were still in the full vigor of manhood, with apparently a long career still before them. To the latter class belonged the subject of this sketch.

Thomas Mutter Cleeman was born in Philadelphia, July 31, 1843. In

his youth he attended the school of Mr. Gregory in this city, where he formed many of the warm and close friendships which continued throughout his life. Entering the University of Pennsylvania in his sixteenth year, he graduated in the class of 1862; and whilst there developed that marked fondness for mathematical studies which clung to him through life. On leaving the University he entered, as a student, the Rensselaer Polytechnic Institute at Troy, N. Y., graduating in 1865. His standing there was a high one, and on graduating he made an address at the Commencement.

His first active work was as Assistant Engineer on the Allegheny Valley Railroad and on the Pennsylvania Railroad, being under Mr. W. H. Wilson, then Chief Engineer, and closely associated in the work of Mr. Joseph M. Wilson.

His intimate friend, Mr. Walton W. Evans, the eminent engineer, well-known for the high order of his work in South America, sent him to Peru in 1871, to supervise the erection of the first viaduct on the Verrugas Railroad. Being attacked with the Verrugas fever soon after his arrival, which lasted for several months, he was unable to work on the bridge. On his recovery he was appointed Division Engineer of the Callao, Lima and Oroya Railroad, where he remained for some years.

On relinquishing his position in 1874 he returned to this country, but was again sent by Mr. Evans to South America in 1876 as Engineer of the Southern Railroad of Chile.

In the interval between his two first visits to South America he was appointed Principal Assistant Engineer of the Main Building of the Centennial Exhibition in Philadelphia. Whilst filling this position he designed the ingenious construction of trusses, forming a central open space, clear of rods, at the junction of the nave and transept of that building.

From 1876 to 1879 he was Assistant Engineer of the Philadelphia Water Department.

In 1880 he was appointed Resident Engineer of the Richmond and Allegheny Railroad in Virginia.

On relinquishing that position he engaged in a general engineering and consulting practice in Philadelphia.

In the winter of 1892-93 he went to Ecuador as Consulting Engineer on the water works at Guyaquil, at the request of his friend, Mr. A. Millet, who was the engineer and contractor. With this as with everything else he undertook, his interest in the success of the undertaking became very great and the exposure he underwent, in consequence, probably cost him his life. His work there was almost completed and he was looking forward to his return in a few days, so as to spend his Christmas with those he loved so tenderly, when he was stricken down with yellow fever. After an illness of about a week he died, on November 16, 1893, a stranger in a strange land far from those who now so deeply mourn his loss.

Mr. Cleeman was elected a member of this Society October 15, 1885.

He was also a member of the American Society of Civil Engineers ; of the Rensselaer Society of Engineers, and of the Engineers' Club of Philadelphia, of which he was a Past President.

In 1892 he delivered a course of lectures on railroads at the Rensselaer Polytechnic Institute, in which he conducted the students through the actual surveys and calculations of the work.

In 1880 he published a work on *Railroad Engineers' Practice*, which has gone through several editions.

Mr. Cleeman was a thoroughly experienced engineer, cautious, intelligent and original in his analysis of theoretical problems, as well as in the execution of engineering work. He was careful to first ascertain that any work he undertook was theoretically correct before carrying it out. His grasp of theoretical subjects was so great that it enabled him to choose wise proximate methods. A friendly critic, he was also a keen one, and his views were generally correct. He did not hesitate to express his opinion on all subjects pertaining to his profession, but never insisted on the acceptance of his view by others ; nor had he any of that selfish push and conceited manner which so often meets with undeserved success. A refined, cultured, courtly gentleman, he was entirely unselfish, modest and retiring. His first thought was always of others, never of himself. He was the light of a large circle of friends, as well as of his family.

His death has caused a heartfelt sorrow and sense of loss, not only in the family circle where his sweet nature and gentle manners will always be missed, but amongst the large number of warm and sincere friends, who also loved and honored him

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*The Dynamics of Boxing.*

*By R. Meade Bache.*

*(Read before the American Philosophical Society, May 4, 1894.)*

The fact that a certain statement lately appearing in the daily press obtained circulation proves how great the general ignorance of some simple physical laws still is. This statement was to the effect that Sandow, "the strong man," is able to strike a blow of 3000 pounds, could break an arm with its impact, and intends to study boxing so as to defeat Corbett. A few observations, therefore, as to the fundamental laws connected with the subject of the possible degree of the deployment of muscular force by human beings in the act of striking a blow will not be out of place for